



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/801,475	03/16/2004	Hsien-Wei Chen	24061.193 (TSMC2003.1410)	1783
42717	7590	01/13/2006	EXAMINER	
HAYNES AND BOONE, LLP 901 MAIN STREET, SUITE 3100 DALLAS, TX 75202			LEWIS, MONICA	
			ART UNIT	PAPER NUMBER
			2822	

DATE MAILED: 01/13/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/801,475

Applicant(s)

CHEN ET AL.

Examiner

Monica Lewis

Art Unit

2822

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 October 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) 15-20 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☒ Claim(s) 14 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 16 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date <u>8/04</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. This office action is in response to the election filed October 12, 2005.

Election/Restrictions

2. Applicant's election with traverse of Embodiment I in the reply filed on 10/12/05 is acknowledged. The traversal is on the ground(s) that the restriction "attempts to identify to species solely by reference to the claims...this approach is specifically prohibited." This is not found persuasive. Although species may be identified by figure numbers, this is not required. The election did clearly set forth two distinct species. The following is claims directed to the following patentably distinct species of the claimed invention:

Embodiment I (Claims 1-14), directed to a semiconductor device comprising a substrate, one or more metallurgy layers, one or more conductive lines, dummy structures from different metallurgy layers are thermally connected and one or more dielectric layers between the metallurgy layers; and

Embodiment II (Claims 19 and 20), directed to a semiconductor device comprising a substrate, one or more metallurgy layers, one or more conductive lines, dummy structures are connected by metal lines, wherein the distance between each of the dummy metal structures and each of the conductive lines is at least .1 um, one or more dielectric layers between the metallurgy layers wherein the dummy structures are connected on a first metallurgy layer are connected to one or more dummy metal structure on a second metallurgy layer through vias.

Art Unit: 2822

Second, Applicant argues that “since the election of any of claims 1-14 and 19-20 will require a search of this class and subclass, the Examiner can examine all of claims 1-14 and 19-20 with out any undue additional burden.” This is not found persuasive because a restriction requires an election between distinct inventions, for example, election between combination and subcombination inventions, and the practice relating to an election between independent inventions, for example, and election of species. See MPEP 808.02.

Finally, note a proper response to a genus/species restriction is the submission of evidence or the identification of such evidence showing the species to be obvious variants or clearly admit on the record that this is the case.

The requirement is still deemed proper and is therefore made FINAL.

Specification

3. The title of the invention is not descriptive. A new title is required that is clearly indicative of the invention to which the claims are directed.
4. The disclosure is objected to because of the following informalities: a) there is no “Brief Summary of the Invention.

Appropriate correction is required.

Content of Specification

- (a) Title of the Invention: See 37 CFR 1.72(a) and MPEP § 606. The title of the invention should be placed at the top of the first page of the specification unless the title is provided in an application data sheet. The title of the invention should be brief but technically accurate and descriptive, preferably from two to seven words may not contain more than 500 characters.
- (b) Cross-References to Related Applications: See 37 CFR 1.78 and MPEP § 201.11.
- (c) Statement Regarding Federally Sponsored Research and Development: See MPEP § 310.

Art Unit: 2822

- (d) The Names Of The Parties To A Joint Research Agreement: See 37 CFR 1.71(g).
- (e) Incorporation-By-Reference Of Material Submitted On a Compact Disc: The specification is required to include an incorporation-by-reference of electronic documents that are to become part of the permanent United States Patent and Trademark Office records in the file of a patent application. See 37 CFR 1.52(e) and MPEP § 608.05. Computer program listings (37 CFR 1.96(c)), "Sequence Listings" (37 CFR 1.821(c)), and tables having more than 50 pages of text were permitted as electronic documents on compact discs beginning on September 8, 2000.

Or alternatively, Reference to a "Microfiche Appendix": See MPEP § 608.05(a). "Microfiche Appendices" were accepted by the Office until March 1, 2001.

- (f) Background of the Invention: See MPEP § 608.01(c). The specification should set forth the Background of the Invention in two parts:
 - (1) Field of the Invention: A statement of the field of art to which the invention pertains. This statement may include a paraphrasing of the applicable U.S. patent classification definitions of the subject matter of the claimed invention. This item may also be titled "Technical Field."
 - (2) Description of the Related Art including information disclosed under 37 CFR 1.97 and 37 CFR 1.98: A description of the related art known to the applicant and including, if applicable, references to specific related art and problems involved in the prior art which are solved by the applicant's invention. This item may also be titled "Background Art."
- (g) Brief Summary of the Invention: See MPEP § 608.01(d). A brief summary or general statement of the invention as set forth in 37 CFR 1.73. The summary is separate and distinct from the abstract and is directed toward the invention rather than the disclosure as a whole. The summary may point out the advantages of the invention or how it solves problems previously existent in the prior art (and preferably indicated in the Background of the Invention). In chemical cases it should point out in general terms the utility of the invention. If possible, the nature and gist of the invention or the inventive concept should be set forth. Objects of the invention should be treated briefly and only to the extent that they contribute to an understanding of the invention.
- (h) Brief Description of the Several Views of the Drawing(s): See MPEP § 608.01(f). A reference to and brief description of the drawing(s) as set forth in 37 CFR 1.74.

Art Unit: 2822

- (i) Detailed Description of the Invention: See MPEP § 608.01(g). A description of the preferred embodiment(s) of the invention as required in 37 CFR 1.71. The description should be as short and specific as is necessary to describe the invention adequately and accurately. Where elements or groups of elements, compounds, and processes, which are conventional and generally widely known in the field of the invention described and their exact nature or type is not necessary for an understanding and use of the invention by a person skilled in the art, they should not be described in detail. However, where particularly complicated subject matter is involved or where the elements, compounds, or processes may not be commonly or widely known in the field, the specification should refer to another patent or readily available publication which adequately describes the subject matter.
- (j) Claim or Claims: See 37 CFR 1.75 and MPEP § 608.01(m). The claim or claims must commence on separate sheet or electronic page (37 CFR 1.52(b)(3)). Where a claim sets forth a plurality of elements or steps, each element or step of the claim should be separated by a line indentation. There may be plural indentations to further segregate subcombinations or related steps. See 37 CFR 1.75 and MPEP § 608.01(i)-(p).
- (k) Abstract of the Disclosure: See MPEP § 608.01(f). A brief narrative of the disclosure as a whole in a single paragraph of 150 words or less commencing on a separate sheet following the claims. In an international application which has entered the national stage (37 CFR 1.491(b)), the applicant need not submit an abstract commencing on a separate sheet if an abstract was published with the international application under PCT Article 21. The abstract that appears on the cover page of the pamphlet published by the International Bureau (IB) of the World Intellectual Property Organization (WIPO) is the abstract that will be used by the USPTO. See MPEP § 1893.03(e).
- (l) Sequence Listing. See 37 CFR 1.821-1.825 and MPEP §§ 2421-2431. The requirement for a sequence listing applies to all sequences disclosed in a given application, whether the sequences are claimed or not. See MPEP § 2421.02.

5. The specification is objected to as failing to provide proper antecedent basis for the claimed subject matter. See 37 CFR 1.75(d)(1) and MPEP § 608.01(o). Correction of the following is required: a) metallurgy layers are thermally connected (See Claim 1).

Drawings

6. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the following must be shown or the feature(s) canceled from the claim(s): a) dummy structures comprise different shapes (See Claim 7); and b) dummy structures comprise different sizes (See Claim 9). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Art Unit: 2822

8. Claims 1-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. It is not clear what is meant by the following: a) "at least two of the one or more dummy structures" (See Claims 1 and 2); and b) "two dummy structures" (See Claims 7-10 and 13). Initially, the claim states "one or more dummy structures." It is not clear how there can be "at least two" or "two" when the claim states that there can be **one** or more. Claims 3-6, 11, 12 and 14 depend directly or indirectly from a rejected claim and are, therefore, also rejected under 35 U.S.C. 112, second paragraph for the reasons set above.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 1, 2, 6, 7, 9 and 10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 5,905,289) in view of Tomita et al. (U.S. Publication No. 2005/0035457).

In regards to claim 1, Lee discloses the following:

a) a semiconductor substrate (10) (For Example: See Figure 12);

b) one or more metallurgy layers connected to the semiconductor substrate, wherein each of the one or more metallurgy layers comprises one or more conductive lines (20 and 22) and one or more dummy structures (44) between the one or more conductive lines (For Example: See Figure 12); and

c) one or more dielectric layers (48 and 46) between the one or more metallurgy layers (For Example: See Figure 12).

Art Unit: 2822

In regards to claim 1, Lee fails to disclose the following:

- a) dummy structures from different metallurgy layers are thermally connected.

However, Tomita et al. ("Tomita") discloses a semiconductor device that has dummy structures (29a and 15a) from different metallurgy layers that are thermally connected (28c) (For Example: See Figure 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device that has dummy structures from different metallurgy layers that are thermally connected as disclosed in Lin because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

In regards to claim 2, Lee fails to disclose the following:

- a) dummy structures on a first metallurgy layer are connected to at least the dummy structures on a second metallurgy layer through a plurality of vias.

However, Tomita discloses a semiconductor device that has dummy structures (29a) on a first metallurgy layer are connected to at least the dummy structures (15a) on a second metallurgy layer through a plurality of vias (28c) (For Example: See Figure 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device that has dummy structures from different metallurgy layers that are connected through vias as disclosed in Lin because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

In regards to claim 6, Lee discloses the following:

a) the width of one of the one or more dummy structures is substantially the same as the width of the one or more conductive lines (For Example: See Figure 12).

In regards to claim 7, Lee fails to disclose the following:

a) the two dummy comprise different shapes.

However, Tomita discloses a semiconductor device where two dummy structures comprise different shapes (For Example: See Figure 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device where two dummy structures comprise different shapes as disclosed in Lin because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

In regards to claim 9, Lee fails to disclose the following:

a) the two dummy comprise different sizes.

However, Tomita discloses a semiconductor device where two dummy structures comprise different sizes (For Example: See Figure 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device where two dummy structures comprise different sizes as disclosed in Lin because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

Art Unit: 2822

In regards to claim 10, Lee fails to disclose the following:

a) the two dummy structures are connected by a first line, wherein the width of the first line is less than the width of each of the two dummy structures.

However, Tomita discloses a semiconductor device where two dummy structures are connected by a first line, wherein the width of the first line is less than the width of each of the two dummy structures (For Example: See Figure 7). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device where two dummy structures are connected by a first line, wherein the width of the first line is less than the width of each of the two dummy structures as disclosed in Lin because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

11. Claims 3, 4 and 11-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 5,905,289) in view of Tomita et al. (U.S. Publication No. 2005/0035457) and *Microchip Fabrication* by Peter Van Zant.

In regards to claim 3, Lee fails to disclose the following:

a) at least one or more dummy structure comprises copper.

However, Van Zant discloses the use of copper (For Example: See Pages 400-401). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include the use of copper as disclosed in Van Zant because it is a better conductor (For Example: See Page 401).

Art Unit: 2822

Additionally, since Lee and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Lee.

In regards to claim 4, Lee fails to disclose the following:

a) at least one or more dummy structure comprises aluminum.

However, Van Zant discloses the use of aluminum (For Example: See Pages 398-399). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include the use of aluminum as disclosed in Van Zant because it aids in providing low resistivity (For Example: See Pages 398-399).

Additionally, since Lee and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Lee.

In regards to claim 11, Lee fails to disclose the following:

a) the first line comprises copper.

However, Van Zant discloses the use of copper (For Example: See Pages 400-401). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include the use of copper as disclosed in Van Zant because it is a better conductor (For Example: See Page 401).

Additionally, since Lee and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Lee.

In regards to claim 12, Lee fails to disclose the following:

a) the first line comprises aluminum.

However, Van Zant discloses the use of aluminum (For Example: See Pages 398-399). It would have been obvious to one having ordinary skill in the art at the time the invention was

made to modify the semiconductor of Lee to include the use of aluminum as disclosed in Van Zant because it aids in providing low resistivity (For Example: See Pages 398-399).

Additionally, since Lee and Van Zant are both from the same field of endeavor, the purpose disclosed by Van Zant would have been recognized in the pertinent art of Lee.

In regards to claim 13, Lee fails to disclose the following:

a) another two dummy structures are connected by a second line, wherein the first lien and the second line comprise identical materials.

However, Tomita discloses a semiconductor device that has another two dummy structures that are connected by a second line, wherein the first lien and the second line comprise identical materials (For Example: See Figure 6). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include a semiconductor device that has another two dummy structures are connected by a second line, wherein the first lien and the second line comprise identical materials as disclosed in Tomita because it aids in protecting against external noise (For Example: See Paragraph 8).

Additionally, since Lee and Tomita are both from the same field of endeavor, the purpose disclosed by Tomita would have been recognized in the pertinent art of Lee.

12. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 5,905,289) in view of Tomita et al. (U.S. Publication No. 2005/0035457) and Iguchi (U.S. Patent No. 6,225,697).

In regards to claim 5, Lee fails to disclose the following:

a) the distance between one the dummy structures and one of the one or more conductive lines is at least .1 μm .

However, Iguchi discloses the distance between one the dummy structures and one of the one or more conductive lines is at least .1 um (For Example: See Figure 1 and Column 7 Lines 23-33). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include that the distance between one the dummy structures and one of the one or more conductive lines is at least .1 um as disclosed in Iguchi because it aids in reducing wire capacitance (For Example: See Column 7 Lines 23-33).

Additionally, since Lee and Iguchi are both from the same field of endeavor, the purpose disclosed by Iguchi would have been recognized in the pertinent art of Lee.

13. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Lee (U.S. Patent No. 5,905,289) in view of Tomita et al. (U.S. Publication No. 2005/0035457) and Landis (U.S. Publication No. 2004/0195670).

In regards to claim 8, Lee fails to disclose the following:

a) the two dummy structures comprise different materials.

However, Landis discloses two dummy structures (35 and 50) that comprise different materials (For Example: See Paragraphs 24 and 25). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the semiconductor of Lee to include two dummy structures that comprise different materials as disclosed in Landis because it aids in reducing deflections (For Example: See Paragraph 3).

Additionally, since Lee and Landis are both from the same field of endeavor, the purpose disclosed by Landis would have been recognized in the pertinent art of Lee.

Art Unit: 2822

Allowable Subject Matter

14. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

15. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Monica Lewis whose telephone number is 571-272-1838. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Zandra Smith can be reached on 571-272-2429. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300 for regular and after final communications. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

ML

December 23, 2005

A handwritten signature in black ink, appearing to be 'ML' followed by a long horizontal stroke.